

Ericoid Shrubs at SPRUCE

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Ericoid mycorrhizal shrubs

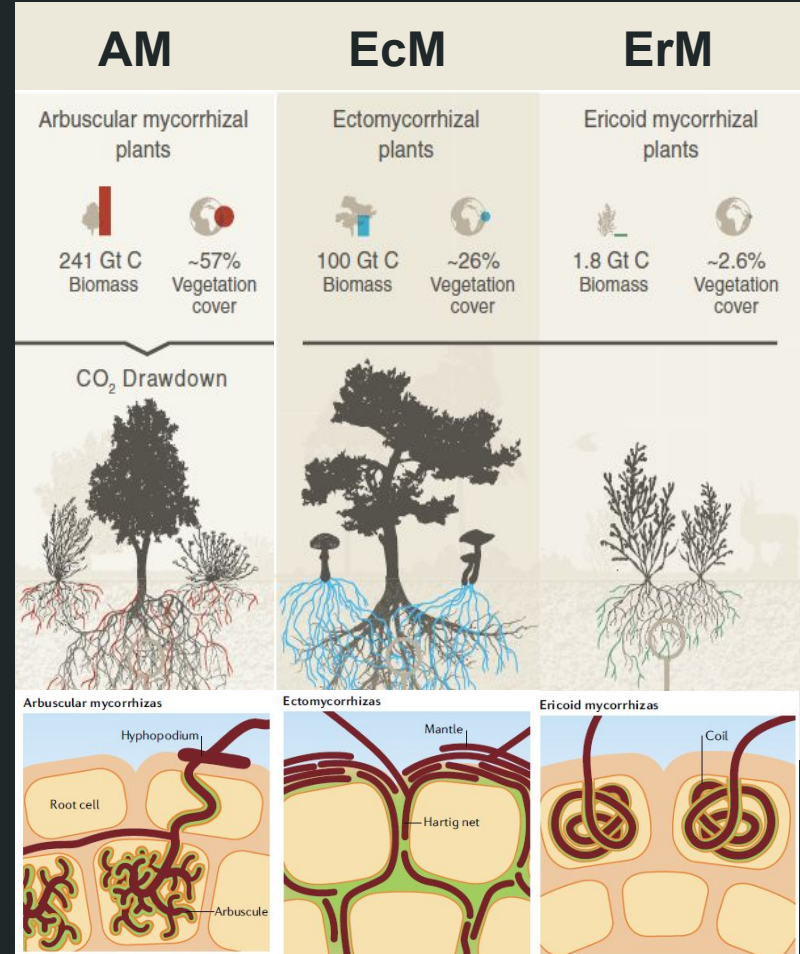
Ericoid mycorrhizal (ErM) shrubs, <1% of plant spp

- Ericaceae, Diapensiaceae

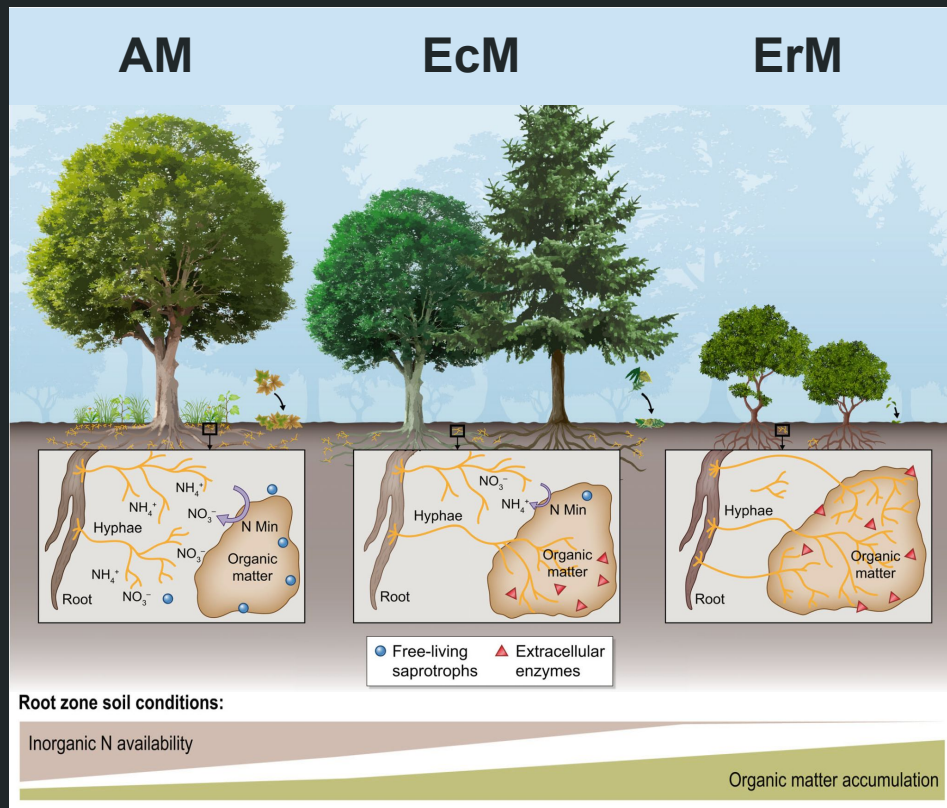
Small fraction of global cover and biomass

Unique fungal community

- Ascomycetes and Basidiomycetes
- High capacity to decay organic matter



Ericoid mycorrhizal shrubs



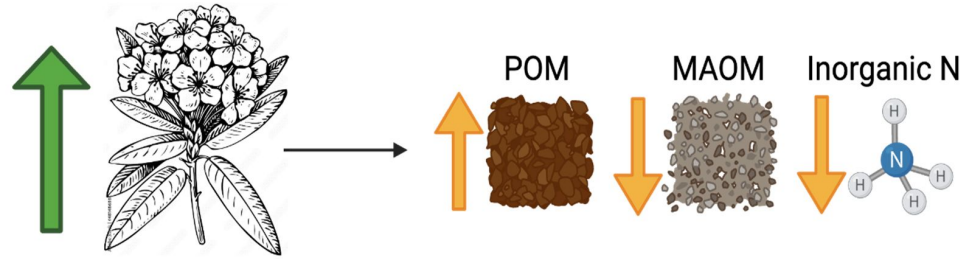
- Biogeochemical frameworks focus on arbuscular (AM) and ectomycorrhizal (EcM) trees
- ErM shrubs appear to have an outsized impact on biogeochemistry

Ericoid shrubs tend to increase particulate organic matter and reduce N availability.

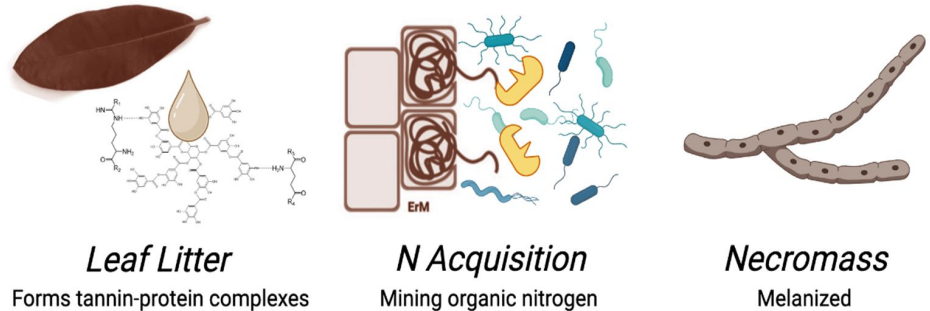
Potential mechanisms?

- Foliar tannins
- ErM fungi mine organic N
- Fungal melanin

Ericoid shrubs influence soil C and N cycling:



Potential mechanisms:



Are these ericoid mechanisms weakening with warming (and elevated CO₂) at SPRUCE?

- Although ericoid shrubs are responding positively to increasing temperature, increasing in cover and biomass...
McPartland et al. 2020; Hanson et al. 2025
- They might be relying more on direct root uptake of nutrients, as shrubs fine root productivity is increasing...
Malhotra et al. 2020
- Shrub foliar N is increasing...
Salmon et al. ESS meeting poster
- And dark hyphae (ericoid?) are reduced with warming
Defrenne et al. 2021

1. Foliar Tannins

Tannin-rich litter precipitates protein and slows N-cycling.

Does warming (+ elevated CO₂) reduce production of of tannins (or other polyphenols)?

- Use shrub leaf litter samples from SPRUCE (2024 samples?)
- Extract tannins with methanol...
- Analyze at Clemson Analytical lab

2. ErM Fungal Community

Ericoid mycorrhizal fungal communities are diverse, some fungi have ability to degrade organic matter.

Do ericoid shrubs shift their fungal associates under warming + elevated CO₂?

Hyphal ingrowth bags (40 um mesh, filled with sand)

- Deployed at 2 depths (5 cm and 20 cm?) from late June/early July - late August.
- 12 plots x 2 depths x 4-5 reps = 96-120 bags
- Float hyphae from bags, extract DNA, amplify ITS2 gene region (gITS7 and ITS4) and Illumina sequence

3. Mycorrhizal Fungal Melanin

Prior studies at SPRUCE:

- Fernandez et al. 2019 - melanin slows decay
- Defrenne et al. 2020 - less dark hyphae produced in warmest plot...

... but melanin has not been directly quantified for entire fungal communities.

Is warming reducing the melanin concentration of mycorrhizal fungi?

Same hyphal ingrowth bags

- Subsample of hyphae used to quantify melanin concentration

Questions & Suggestions?
